



DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS REGULATIONS BOARD
WASHINGTON, D.C. 20590

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[Docket No. HM-102; Amdt. No. 173-78A]

PART 173—SHIPPERS

Flammable, Combustible, and Pyrophoric Liquids; Definitions

The purpose of these revisions to the amendment made under Docket HM-102; Amdt. 173-78 is to:

(1) Permit the use of an additional test method for the determination of flash points,

(2) Modify the evaporation requirements for mixtures,

(3) Permit the marking of the flash point range of materials as an alternative to the marking of a specific flash point on the outside package,

(4) Specify the minimum flash point of certain aqueous solutions containing alcohol,

(5) Grant a special exemption for alcoholic beverages, and

(6) Extend the mandatory compliance date of amendments made under Docket HM-102.

On January 24, 1974, the Board published amendments 172-23, 173-78, 174-19, and 177-29 (39 FR 2768) to: (1) specify a new definition for the class of materials identified as "Flammable liquid";

(2) create and define a new class of materials identified as "Combustible liquid"; (3) modify the definition for pyrophoric liquids within the flammable liquid class; and (4) set forth the requirements for the materials that are covered by the new definitions. Since publication of the amendments, a large number of petitions have been received by the Board pertaining to the amendments and the Board has decided that many of the petitions have merit.

Setaflash tester. Several petitions have been received for the addition of the Setaflash closed tester for flash point testing. This apparatus has been subjected to extensive testing within the United States and Europe. Standard test procedures for its use have been issued by the American Society for Testing and Materials (ASTM), The International Standards Organization (ISO), and the British Standards Institution (BSI). The Setaflash tester has been presented as suitable for highly viscous materials such as pastes. Special advantages of the Setaflash tester include: (1) increased safety due to small sample size required (2 milliliters vs. 50 to 70 milliliters for Tag or Pensky-Martens); (2) a decrease in the time necessary to run a test due to the small sample size, with a corresponding reduction in the heating time at different temperatures; and (3) data comparing the Setaflash tester with other flash point testers indicates that the Setaflash test gives better reproducibility and repeatability because it produces a vapor equilibrium test results.

On these considerations, the Board has decided to specify two standard test methods, using the Setaflash tester, as alternate test methods for the determination of flash points.

Evaporation procedures. A number of questions concerning the validity of the evaporation requirement and the double testing of mixtures having components of widely differing volatilities and flash points have been raised. The Board believes safety considerations require that provisions be made for the most hazardous situation that could reasonably be expected to occur and, since flash point is the sole criterion specified for the classification of flammable and combustible liquids, it is necessary to classify a material according to the lowest flash point that could reasonably be expected to occur. The requirement for the evaporation of 90% of the original volume before retesting is not feasible for mixtures containing 10% or less volatiles. Therefore, the Board has changed the requirements to specify an evaporation time as an alternative to the 90% evaporation requirement. Also, no evaporation temperature was specified in the amendment; therefore, in many cases it would have been possible to selectively remove any component desired. By specifying an evaporation temperature in conjunction with an evaporation time or volume decrease, the Board believes these concerns will be alleviated.

Specification of flash point vs. flash point range. In order to use the partial exemptions specified in § 173.118 (a) (3) and (b), for flammable liquids with a flash point between 73° F. and 100° F., amendment 173-78 required that the flash point must be marked on the outside of the package. It is not necessary to show the exact flash point of a flammable liquid as long as marking indicates that the flash point is 73° F. or higher. Therefore, changes are being made to permit an alternative marking.

One petitioner questioned the need for marking flash points on containers in order to qualify for these partial exemptions since no similar requirement exists for such a marking on smaller quantity packagings. The reason for the marking is to provide a visual affirmation that the material in the package has a flash point high enough to qualify for partial exemptions when in quantities of more than one quart. The small quantity partial exemption presently in effect differentiates between metal containers (up to one quart) and other kinds of containers (up to one pint). The new partial exemption (up to and including one gallon) applies to flammable liquids having flash points from 73° F. to 100° F. and does not specify the material of construction for their packaging. Therefore, the marking will be an indication that the flammable liquid (73-100° F.) is authorized under the partial exemption where the absence of such a marking will be an indication that specification packaging, marking, and labeling is required. The same applies to packaging having capacities of more than 1 gallon which would not be subject to the specification packaging requirements if they

are marked to indicate that the flash point is 73° F. or higher. Therefore, the petition for removal of the flash point marking requirement is hereby denied.

Alcohol water solutions. The Board has decided to make a declaration in the regulations that the flash point of dilute alcohol water solutions, containing no more than 24 percent alcohol by volume, are considered to have flash points of 100° F. or higher because the Board believes the combustible liquid classification is more appropriate for such materials (if they have a flash point below 200° F.). The declaration is applicable only when the remainder of the solution does not meet any definition of a hazardous material as defined in Title 49 CFR including those of a flammable or a combustible liquid. This decision is based in part on petitions for reconsideration received relative to wine and certain consumer commodities. The maximum alcohol content specified is based on the maximum alcohol content for wine as defined in 27 CFR 4.10 which is 24% by volume alcohol. Rather than restrict this revision to the wine industry, it has been expanded to include other alcohol water solutions.

Exemption for alcoholic beverages. A special provision for alcoholic beverages is included in this amendment to provide complete exemption from the Department's Hazardous Materials Regulations when they are shipped in containers having a rated capacity of one gallon or less. These beverages are restricted to those defined in 27 CFR 4.10 and 5.11 as wine and distilled spirits. Due to the controls exercised by the Department of the Treasury pertaining to these products, the Board believes that it is unnecessary, from a transportation safety standpoint, to make them subject to the Department's regulations.

Environmental impact. Pursuant to the provisions of section 102(2)(c) of the National Environmental Policy (42 U.S.C. 4321 et seq.), the Board has considered the requirements of that Act concerning Environmental Impact Statements and has determined that this amendment would not have a significant impact upon the environment. Accordingly, an Environmental Impact Statement is not necessary and will not be issued with respect to this amendment.

For purposes of clarity, several editorial changes have been made to §§ 173.115 and 173.118, and the two sections are set forth in this amendment in their entirety.

In consideration of the foregoing, §§ 173.115 and 173.118 of Part 173 are revised to read as follows:

1. In Part 173 Table of Contents, the headings of Subpart C and § 173.115 are revised to read as follows:

Subpart C—Flammable, Combustible and Pyrophoric Liquids; Definitions and Preparation

Sec.

173.115 Flammable, Combustible, and Pyrophoric liquids; Definitions.

2. § 173.115 is revised to read as follows:

§ 173.115 Flammable, combustible, and pyrophoric liquids; definitions.

(a) **Flammable liquid.** (1) For the purposes of this subchapter, a flammable liquid means any liquid having a flash point below 100° F. (37.8° C.), with the following exceptions:

(i) Any liquid meeting one of the definitions specified in § 173.300;

(ii) Any mixture having one component or more with a flash point of 100° F. (37.8° C.) or higher, that makes up at least 99 per cent of the total volume of the mixture;

NOTE 1: A flammable liquid with a flash point of 73° F. or higher in packaging having a capacity of 110 gallons or less packaged prior to January 1, 1976, may be shipped and transported without being subject to any of the requirements of this subchapter applicable to flammable liquids until January 1, 1977.

(2) For the purposes of this subchapter, a distilled spirit of 140 proof or lower is considered to have a flash point no lower than 73° F.

(b) **Combustible liquid.** (1) For the purposes of this subchapter, a combustible liquid is defined as any liquid that does not meet the definition of any other classification specified in this subchapter and has a flash point at or above 100° F. (37.8° C.) and below 200° F. (93.3° C.) except any mixture having one component or more with a flash point at 200° F. (93.3° C.) or higher, that makes up at least 99 per cent of the total volume of the mixture.

(2) For the purposes of this subchapter, an aqueous solution containing 24 per cent or less alcohol by volume is considered to have a flash point no less than 100° F. (37.8° C.) if the remainder of the solution does not meet the definition of a hazardous material as defined in this subchapter.

(3) 200° F. (93.3° C.) is a limitation of the application of the regulations in this subchapter and should not be construed as indicating that liquids with higher flash points will not burn. Markings such as "NONFLAMMABLE" or "NONCOMBUSTIBLE" should not be used on a vehicle containing a material that has a flash point of 200° F. (93.3° C.) or higher.

(c) **Pyrophoric liquids.** (1) For the purposes of this subchapter, a pyrophoric liquid is any liquid that ignites spontaneously in dry or moist air at or below 130° F. (54.5° C.).

NOTE 1: The Bureau of Explosives is equipped to test samples of flammable liquids to determine whether or not they are pyrophoric.

(d) **Flash point.** (1) "Flash point" means the minimum temperature at which a liquid gives off vapor within a test vessel in sufficient concentration to form an ignitable mixture with air near the surface of the liquid and shall be determined as follows:

(i) For a homogeneous, single-phase, liquid having a viscosity less than 45 S.U.S. at 100° F. (37.8° C.) that does not form a surface film while under test, one of the following test procedures shall be used:

(A) Standard Method of Test for Flash Point by Tag Closed Tester, (ASTM D56-70);

(B) Standard Method of Test for Flash Point of Aviation Turbine Fuels by Setaflash Closed Tester, (ASTM D3243-73) or

(C) Standard Methods of Test for Flash Point of Liquids by Setaflash Closed Tester, (ASTM D3278-73).

(ii) For a liquid other than one meeting all of the criteria of subparagraph (d)(1)(i) of this paragraph, one of the following test procedures shall be used:

(A) Standard Method of Test for Flash Point by Pensky-Martens Closed Tester, (ASTM D93-71). Alternate tests authorized in this standard may be used.

(B) Standard Method of Test for Flash Point of Aviation Turbine Fuels by Setaflash Closed Tester, (ASTM D3243-73), or

(C) Standard Methods of Test for Flash Point of Liquids by Setaflash Closed Tester, (ASTM D3278-73).

(2) For a liquid that is a mixture of compounds that have different volatility and flash points, its flash point shall be determined as specified in paragraph (d)(1) of this section, on the material in the form in which it is to be shipped. If it is determined by this test that the flash point is higher than 20° F. (-6.67° C.) a second test shall be made on a sample of the liquid evaporated from an open beaker (or similar container), under ambient pressure and temperature (20 to 25° C.) conditions, to 90 percent of its original volume or for a period of 4 hours, whichever comes first. The lower flash point of the two tests shall be the flash point of the material.

(3) For flash point determinations by Setaflash closed tester, the glass syringe specified need not be used as the method of measurement of the test sample if a minimum quantity of 2 milliliters is assured in the test cup.

(e) "S.U.S." means Saybolt Universal Seconds as determined by the Standard Method of Test for Saybolt Viscosity (ASTM D88-56) (reapproved 1968) and may be determined by use of the S.U.S. conversion tables specified in ASTM Method D2161-66 following determination of viscosity in accordance with the procedures specified in the Standard Method of Test for Viscosity of Transparent and Opaque Liquids (ASTM D445-65).

(f) **Viscous liquids.** Flammable liquids are described as viscous flammable liquids based on the viscosity as determined by one of the following methods:

(1) The viscosity of the liquids must be determined in a Stormer viscosimeter with an actuating weight of 400 grams and with the liquid maintained at a temperature of 28° C. The cylinder of the viscosimeter must be immersed in the liquid.

(2) For transparent liquids the sample may be tested in a vertical glass tube, 1-inch inside diameter by approximately 13 inches long, having two marks 10 inches apart engraved thereon, the lower mark being 2 inches above the bottom of the tube. The liquid to be tested shall be poured into the tube until its surface rises one-half inch above the upper mark

and must be maintained at a temperature of 28° C. during the test; a polished steel ball one-fourth inch in diameter shall be supported one-half inch above the surface of the liquid at the center of the tube and dropped therein.

(3) When the speed of the cylinder in the first test does not exceed 10 rotations per 13 seconds, or the time required in the second test for the ball to fall the vertical distance between the two lines upon the glass tube is less than 4 seconds, the material is classed as "viscous."

(g) If experience or other data indicate that the hazard of a material is greater or less than indicated by the criteria specified in paragraphs (a), (b), and (c) of this section, the Department may revise its classification or make material subject to the requirements of Parts 170-189 of this subchapter.

3. In § 173.118 paragraphs (a) and (b) are revised; paragraphs (c) and (d) redesignated paragraphs (d) and (e) respectively; a new paragraph (e) added to read as follows:

§ 173.118 Exemptions for flammable and combustible liquids.

(a) Flammable liquids, except for which no exemptions are provided indicated by the "No exemption" statement in § 172.5 of this subchapter unless otherwise provided, exempt specification packaging, marking, labeling requirements when packaged in accordance with one of the following subparagraphs of this paragraph (a) that marking name of contents on outside container is required for shipments via carrier by water. Shipments for transportation by highway are exempt also from Part 177 of this subchapter except § 177.817:

(1) In metal containers not exceeding quart capacity each, packed in outside containers,

(2) In containers having a capacity not over 1 pint or 16 ounces by volume each, packed in strong outside containers, or

(3) In inside containers having a capacity of one gallon, or less, packed in strong outside container provisions of this partial exemption apply only if the flash point of the material is 73° F. or higher and the point, or an indication that the point is 73° F. or higher is marked on outside package.

(b) A flammable liquid having a flash point of 73° F. or higher is not subject to the specification packaging requirements of this Part when in a packaging having a capacity of 110 gallons or less. The provisions of this paragraph apply only if the flash point of the material, or an indication that its flash point is 73° F. or higher, is marked on the outside package.

(c) Alcoholic beverages (wine and distilled spirits as defined in 27 CFR and 5.11) in containers having a capacity of one gallon or less are exempt from the requirements of this subchapter.

(d) Combustible liquids in pipes, tanks, cargo tanks, or tank cars are exempt from the requirements of this subchapter except those that pert

- (1) Shipping papers, waybills, switching orders or other billing.
- (2) Marking of portable tanks,
- (3) Marking or placarding rail cars and motor vehicles, and
- (4) Reporting incidents as prescribed in §§ 171.15 and 171.16 of this subchapter.

(e) The requirements of this subchapter do not apply to combustible liquids in packagings having capacities of 110 gallons or less.

Effective date: This amendment is effective January 1, 1976. However, immediate compliance with the regulations, as amended herein, is authorized except as they pertain to the placarding of tank cars containing combustible liquids.

(18 U.S.C. 831-835; Sec. 6, Pub. L. 90-870, 80 Stat. 937 (49 U.S.C. 1655); Title VI and Sec. 902(h) of Pub. L. 85-726 (49 U.S.C. 1421-1431, 1472(h)))

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